

We Claim:

1. An apparatus for diagnosis of tissue, comprising:
 - a) a light source;
 - b) a MOEMS rapid scanning delay line coupled to the light source;
 - c) a quasi optics chopper coupled to the MOEMS rapid scanning delay line;
 - d) a terahertz transmitter coupled to the quasi optics chopper;
 - e) a first quasi optics systems coupled to the transmitter, the first quasi optics system outputting light directed at a sample;
 - f) a second quasi optics system optically coupled to the sample, the second quasi optics system receiving light reflected from the sample;
 - g) a detector coupled to the second quasi optic system;
 - h) a matching amplifier coupled to the detector;
 - i) a sample stepper; and
 - j) a control and display system coupled to the sample stepper, the matching amplifier, the transmitter, the quasi chopper and the scanner.
2. A method for diagnosis of tissue, comprising:
 - a) transmitting femtosecond pulsed laser light through a fiber carrier;
 - b) splitting the femtosecond pulsed laser light into a pump light beam and a reference light beam;
 - c) inserting into the optical path a MOEMS rapid scanning delay line to generate wide bandwidth terahertz quasi optical pulses and;
 - d) illuminating the tissue with pulses of electromagnetic radiation in terahertz frequency range.
3. The method of Claim 2, further comprising using a sample stepper dynamically synchronized to the scanned terahertz pulses that are illuminating the sample.

4. The method of Claim 3, further comprising setting up a terahertz detector to detect the difference signal between the reflected terahertz light from the sample and a reference beam split from the reflected terahertz light.
5. The method of Claim 4, further comprising using matching amplifiers to improve the detected signals.
6. The method of Claim 4, further comprising forming an image from the reflected pulses at each layer perpendicular to the tissue surface.
7. The method of Claim 4, further comprising:
 - a) comparing the images with a calibrated reference stored in memory;
 - b) combining the images at different layers to obtain the tomography of the tissue;
 - c) indicating regions of coincidence and region of non-coincidence; and
 - d) showing the result in control and display system.
8. The apparatus of Claim 1, wherein the femtosecond pulsed laser is transmitted through fiber for handheld diagnosis system.
9. The apparatus of Claim 1, wherein the MOEMS rapid scanning delay line is a miniature package.
10. The apparatus of Claim 1, wherein the sample stepper is inside a handheld system together with the other elements recited in Claim 1.
11. The apparatus of Claim 1, wherein the sample stepper is outside a handheld system that includes all of the other elements recited in Claim 1.
12. The apparatus of Claim 1, wherein a display system is inside a handheld system together with the other elements recited in Claim 1.
13. The apparatus of Claim 1, wherein a display system is outside a handheld system that includes all of the other elements recited in Claim 1.

14. The apparatus of Claim 1, wherein quasi optics kinoform lenses are used for size reduction suitable for handheld diagnosis system.
15. The method of Claim 2, wherein the pulses of electromagnetic radiation have duration from 10-1000 femtoseconds to cover terahertz bandwidth from 100-10000 GHz.
16. The method of Claim 2, wherein the MOEMS rapid scanning delay line generates high speed delay line patterns using a blazed grating and a bounced mirror combined with a MOEMS scanner.
17. The method of Claim 2, wherein the quasi optic output of the MOEMS rapid scanning delay line is coupled to a quasi optics chopper.
18. The method of Claim 17, wherein the quasi optics chopper is a miniature micro-electro-mechanical (MEM) optical chopper in which a plate chops the terahertz beam each time the plate interrupts the terahertz beam.
19. The method of Claim 2, wherein transmitting the femtosecond pulse is accomplished by a semiconductor biased by a DC power, coupled to a terahertz antenna which radiates terahertz waves that illuminate the tissue when excited by femtosecond pulsed laser light.
20. The method of Claim 19, wherein the terahertz detector is identical to the transmitter and wherein the terahertz antenna is designed to receive terahertz frequency radiation reflected from the tissue.
21. The method of Claim 4 wherein the detector acts as a convolver to detect the reflected terahertz pulses from the tissue, which arrive at detector, synchronized to its split reference beam.

22. The method of Claim 7, further providing a three dimensional image of the tissue in real time which includes compositional information about the tissue.
23. The method of Claim 22, wherein the image is comprised of a plurality of horizontal bands, each band being adjacent to another, with equal bandwidths.
24. The method of Claim 23, wherein each horizontal band being comprised of a plurality of pixels, each being adjacent to another.
25. The method of Claim 24, further including comparing the images with a calibrated reference stored in handheld memory, indicating regions of coincidence and region of non-coincidence, and combining the images at different layers to obtain the tomography of the tissue.
26. The method of Claim 2, wherein the diagnosis results are shown in a handheld display system.
27. The method of Claim 22, wherein the diagnosis results could be transmitted to a medical center by wireless if patient is desired.